



Why can't you tickle yourself?

One way that is guaranteed to cheer up a tired, cross child or to reduce an adult to a simpering fit of giggles is a few light strokes on the sole of the foot or the armpit. Some people are more tickly than others, and ticklishness varies from situation to situation.¹ But 1 question has baffled minds for years: why can't you tickle yourself? Go on—try it. The sensation produced will never rival that of an external stimulus.

The sensation of tickle is perceived by the part of the brain called the somatosensory cortex (also called S1). Studies using functional magnetic resonance imaging, a technique that shows changes in brain activity in different situations according to cerebral blood flow, have shown increased S1 activity in response to an externally produced tactile stimulus. However, the same activity is not produced after an identical, self-produced stimulus.²

We need to turn our attention away from the cortical areas of the brain to the cerebellum, a structure attached to its base, to understand why this is the case. The cerebellum has a role in coordinating movement and receives both sensory input from the body (through the spinal cord) and motor input from the higher cortical areas that command movement. In other words, 1 of its roles is the comparison of the expected response to a stimulus (relying on descending commands from the motor cortex of the brain) with the actual response (relying on sensory feedback from the receptors in the skin). If the 2 responses match, the cerebellum kicks in a mechanism to suppress the effects of the stimulation, and the end result is diminished activity in the somatosensory cortex and with it, diminished perception of the tickle. This cancellation of the sensory consequences of a motor command is a phenomenon known as refference.³

OTHER FACTORS

Of course, other factors are involved. The predictability of the stimulus is important; if subjects are blindfolded, they will report a greater tickle sensation. Sensory feedback from the limb doing the tickling also acts to reduce the feeling. There may also be social or sexual influences—for example, the sensation can be greater if tickled by someone of the opposite sex. Subjects report the greatest tickle sensation while their eyes are closed, because there is an absence of feedback, refference, and predictability.³

Much has been written about tickling. An obvious problem with any research into the subject is the strong degree of subjectivity because it relies heavily on subjects' descriptions. Subjective experiences of ticklishness will, of course, vary among individuals. There is no way to choose subjects for experiments who will have identical tickle thresholds. Furthermore, the same external stimulus does

not always produce the same sensation, either between individuals or in the same person between different situations. A neurologist examining a patient's plantar reflexes by running a spatula along the sole of the foot will rarely be met with resistance and giggles. The same stimulus applied by 1 friend to another is much more likely to produce the classic response. Presumably the patients are mentally prepared, regarding it as right and proper that the physician should touch their body.¹ Whatever the reason, it hinders objective analysis of tickling.

PAVLOVIANISM

Ivan Pavlov showed that dogs could be conditioned to salivate as a reflex at the ringing of a bell that usually signaled food, even when none was produced. An element of pavlovian conditioning exists in the tickle response. Subjects in 1 study reported the sensation of tickle when the examiner's hand approached but did not touch their bodies and even when exposed to a verbal stimulus—"coochie-coo"—which was associated in their minds with the onset of a tickle.^{4,5} Remember the children's rhyme: "Round and round the garden, Like a teddy bear, 1 step, 2 step, Tickle me under there!"

What child who knows the poem will not start to giggle and squirm somewhere around the second line? Conversely, there may be a conscious ability to control the perceived magnitude of a sensation if it is expected. For example, the drone of a fire alarm seems much louder if it catches you unaware—if you are warned in advance, the sound will seem quieter. There may be a similar pattern in the tactile system.

MULTIFACTORIAL PHENOMENON

But this is not the whole story. If I am warned that I am about to be tickled, this mechanism should make the stimulus feel less tickly. It may, however, make me giggle and squirm even more by the pavlovian conditioning mechanism described above. So the tickle phenomenon is multifactorial and results from a combination of the mental preconception that a stimulus is going to be tickly with the tactile stimulation itself.

References

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